REMARKS

Claims 11-16, and 21-32 are at issue. Claims 17-20 have been withdrawn. No claims have been allowed. Claims 21-32 have been added.

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached page is captioned "Version With Markings To Show Changes Made."

The Applicant wishes to express his appreciation to Examiner Markham for the courtesies extended at the telephone interview which was conducted on September 19, 2002. Claim 11 was discussed, including the enclosed amendment thereto. The two cited references to Niino et al. and Matsuyama were also discussed.

Applicant has revised the specification which was submitted by Preliminary Amendment on August 4, 2000 to correspond to the language in the original specification as filed, page 10, line 13 thereof. No new matter has been added.

In the Office Action dated April 2, 2002, the Examiner rejected claims 11, 12 and 15-16 on the basis of Matsuyama (U.S. Patent 5,149,375) and Niino et al. (U.S. Patent 5,637,153) for the reasons set forth in paragraph 7-9 of the previous Office Action.

The Examiner has stated that Applicant's arguments had been fully considered but not found to be persuasive. The Examiner stated that Niino et al. teach activating a cleaning gas by utilizing a hot reaction chamber or a hot atmosphere inside the reaction chamber and that Matsuyama teaches activating various process gases by utilizing a hot filament inside the reaction chamber. Applicant agrees. However, Applicant also notes that Matsuyama teaches activating gases for **depositing** a film within the chamber, rather than removing a deposited film with an activated gas. Applicant therefore submits that Matsuyama teaches away from Applicant's invention in that Matsuyama teaches depositing a film rather than removing a deposited film.

Under well-established case law, there must be some suggestion or teaching in the cited references that their teachings can be combined. By locating individual elements of Applicant's invention, and using Applicant's invention as a blueprint, obviousness cannot be established. See for instance, *W. L. Gore & Associates, Inc. v. Garlock, Inc.*, 220 USPQ. 303, 311, 312 CAFC 1983.

Furthermore, the fact that the teachings of two references can be combined does not indicate obviousness unless the desirability of such modification is suggested by the prior art. See *In re Fritch*, 23 USPQ 2nd, 1780, 1785 CAFC 1992; *ACS Hospital Systems, Inc. v. Montefiore Hospital et al.*, 221 USPQ 929, 933 CAFC 1994. Applicant submits that neither reference suggests the desirability of the combination of their teachings.

The Examiner has asserted that activating a process gas by utilizing a hot reaction chamber (as taught by Niino et al.) and activating a process gas by utilizing a hot filament inside the reaction chamber (as taught by Matsuyama) are equivalent methods of heating and activating process gases. A comparison of the two methods indicates that they are not equivalent. Niino et al. teaches a method whereby the cleaning gas is heated by direct contact with a heated surface on which the film to be removed is deposited. The cleaning gas arrives at the heated surface and reacts with the deposited material and thereby changes the deposited material to a volatile material by means of a chemical reaction with the aid of heat. The volatile material is thereafter exhausted from the chamber. The cleaning gas is in principle consumed at the heated surface. On the contrary, in the present invention (similarly to Matsuyama) the cleaning gas is activated away from the deposited film in the chamber due to the heat supplied from the heated hot element. At the heated hot element, the cleaning gas is not consumed. Instead, the activated species of the cleaning gas is generated at the hot element. Thereafter, the activated gas diffuses and flows toward the deposited film to be removed. At the deposited film, the activated species of the cleaning gas reacts with the deposited material and changes it to a volatile material which is thereafter exhausted from the chamber.

From the above, it is evident that the functions of the gas heating portion of the two methods described in the two cited patents are quite different. The method of Niino et al. only enhances the reaction rate of the cleaning gas and the deposited material. The site where the material to be removed is deposited must therefore be heated. In distinction therefrom, in the present invention, similarly to Matsuyama, the function of the heated portion is to generate the activated species of the cleaning gas, and the site where the material to be removed is deposited does not need to be heated.

The difference between the above-discussed two methods of heat activating a process gas results in advantages of the present invention over Niino et al. One outstanding advantage is that the heated portion can be heated effectively, because the heat loss is small

since the heated portion is located inside the evacuated environment. On the other hand, in the method of Niino et al., the heat loss is huge compared with Applicant's inventive method, since the heated portion contacts the atmosphere, which result in a large heat loss due to heat conduction and heat convection. Furthermore, in Applicant's inventive method only the hot element needs to be heated locally. On the other hand, in Niino et al.'s method the whole chamber must be heated. This results in a large heat loss because the heat conduction, convection and radiation are largely due to the large surface area of the heated portion. Further, from the viewpoint of safety, in Applicant's method, the chamber wall does not need to be heated. Therefore, Applicant does not have to surround the chamber with another protective cover to assure the safety. Thus, Applicant's apparatus can be very compact.

The hot element can also be placed at different locations from the location shown in figure 1, for example, inside the gas supply vessel.

Applicant also states, on page 10 of the specification, that the objects to be cleaned in the processing chamber may also be heated to increase the removal rate of the deposited films but that such heating is not necessary. An advantage of Applicant's invention is that, since heating of the entire chamber and the walls thereof is not necessary, the time for heating and cooling the processing chamber can be omitted, thereby saving a substantial amount of cleaning time.

In view of the above, since there is no teaching nor suggestion in either of the cited references to combine their teachings, and even if such teachings could be combined, obviousness is not indicated since the desirability of the modification is not suggested in the prior art. Applicant therefore submits that claim 11, as amended, is not obvious in view of the cited prior art.

The Examiner stated that Iwasaki et al. teach that platinum is resistant to corrosive fluorine-based cleaning gas. However, Iwasaki et al. disclose that the chamber inner walls coated with gold or platinum is resistant to such cleaning gas at **room temperature**, not a high temperature. Applicant therefore submits that the reference does not teach that a platinum hot element is resistant to cleaning gas at the high temperatures called for by Applicant's claim 11.

Applicant has submitted two new claims, 21 and 22. Claim 21 calls for providing a heating element outside a chamber, heating the element, then contacting the heated element with a cleaning gas, and thereafter introducing the cleaning gas into the chamber. Support for

claim 21 is found on pages 10 and 11 of the specification. Applicant submits that the cited prior art does not teach such a method and that this claim is in condition for allowance.

Claim 22 calls for first heating the hot element, contacting the hot element with the cleaning gas and thereafter contacting the deposited film with the activated cleaning gas to convert the deposited film into a gaseous substance. Applicant submits that claim 22 is also in condition for allowance.

Applicant respectfully submits that the claims at issue are in condition for allowance and respectfully requests allowance thereof.

In the event Applicant has overlooked the need for an additional extension of time, payment of a fee, or additional payment of a fee, Applicant hereby petitions therefore and authorizes that any charges be made to Deposit Account No. 02-0385, Baker & Daniels.

Should the Examiner have any further questions, he is respectfully invited to telephone the undersigned at 260-460-1695.

Respectfully submitted,

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on October 1, 2002

Michelle L. Neal

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION:

Page 9, the second paragraph has been amended as follows:

The gas ejected from gas outlets 210 is effectively decomposed and/or activated by the platinum of the hot element which is maintained at a high temperature to generate activated species. For example, the hot element is preferably heated at 400°C and 1000°C or higher in the case of employing NF_3 and CF_4 as a cleaning gas, respectively. An activated species that is highly reactive with a deposited film can be generated by the catalytic action of the platinum. The platinum is stable against the activated species. Therefore, the stable film formation can be carried out even after the cleaning treatment. The activated species reacts with the films deposited on the surface of the inner wall, the substrate holder and the like and converts the films into gaseous substances. The films are gradually removed as the gaseous substances thus generated are evacuated outside by the exhaust system.

IN THE CLAIMS:

Claim 11 has been amended as follows:

11. (Amended) A method for removing a deposited film inside a chamber which comprises:

providing a hot element in the chamber, said hot element disposed away from the deposited film, the hot element having at least a surface which comprises platinum;

exhausting said chamber;

heating the hot element to 400° C. or higher;

supplying a cleaning gas into the chamber;

contacting the cleaning gas with the heated hot element to decompose and/or activate the cleaning gas and generate an activated species therefrom;

allowing the activated species to convert the deposited film into a gaseous substance; and

removing the gaseous substance from the chamber.